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Effect of Salicylic Acid on Vase Life of Cut Carnation (*Dianthus caryophyllus* L. cv. 'Liberty Abgr')

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ABSTRACT

In this study, the effect of salicylic acid on vase life and postharvest quality of cut carnation (Dianthus caryophyllus L. 'Liberty Abgr') had been investigated. The experiment was conducted based on completely randomized design with salicylic acid in 4 concentrations (0, 50, 100 and 150 mgl^{-1}) and 3 replications. Analysis of variance revealed that the effect of salicylic acid on vase life and water absorption ($p\leq0.05$) and bacterial colonies population in vase solution and dry matter percentage ($p\leq0.01$). According to mean comparisons, 150 mg l^{-1} salicylic acid had the priority in 3 traits: 12.67 days vase life, 48.17 log$_{10}$CFUml^{-1} bacterial clonies and 12.86% dry matter percent ; and 50 mg l^{-1} had the most water uptake (1.59 ml l^{-1} F.W.).

Keywords: carnation, vase life, bacterial clonies populations, vase solution, salicylic acid

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INTRODUCTION

Carnation (*Dianthus caryophyllus* L.) from to caryophyllaceae family is native to the Mediterranean region and Central Asia [12] and is one of the three most popular cut flowers in the world. *Dianthus caryophyllus* and *Dianthus barbatus* are cultivated as commercial varieties [7, 15]. Carnation cut flowers are sensitive to ethylene and their vase life is reduced by it [9]. So it seems necessary to use anti-ethylene compounds and use of plant growth regulators such as salicylic acid has been suggested ([2, 3, 10, 14]. Salicylic acid as a plant growth regulators play an important role in plant growth and its role in the extension the vase life of cut flowers was approved [2, 17, 18]. Ezhilmathi et al. (2007) found that different concentrations of salicylic acid can delays senescence and extends the vase life and enhances vase life-related properties in gladiolus (*Gladiolus grandiflora*). Alaey et al. (2011) investigated on effects of salicylic acid concentrations (0, 50, 100 and 200 µM) on vase life of cut rose (*Rosa hybrida* cv. 'Black Magic') and stated that salicylic acid extends vase life by disrupting catalase activity and regulation water relations. This study evaluated the effect of salicylic acid on vase life and postharvest quality of cut carnation (*Dianthus caryophyllus* L. 'Liberty Abgr').

MATERIALS AND METHODS

In April 2012, cut carnation flowers cv. 'Liberty Abgr' was purchased from a commercial greenhouse located in Mahallat city and immediately transferred to the postharvest laboratory of Islamic Azad University of Rasht, under standard conditions. 5 cut flowers were placed in 2 liter volume vases and then were treated with the determined concentrations of salicylic acid. Experiment was conducted based on complete randomized design with 4 levels of salicylic acid (0, 50, 100, 150 mg l^{-1}) in 3 replications and 12 plots and 5 cut flowers per plot. The measured traits were vase life, water uptake, bacterial colonies population in vase solution and dry matter percent. The end of vase life was characterized based on petals inrolling index [9]. Solution uptake was calculated by this formula [9]:

Solution uptake (ml g^{-1} F.W)=500-(Amount of vase solution in final day +Amount of room transpiration).

24 h after pulse treatment, 2 ml of vase solution was sampled from each vase and then diluted with 2 ml of 0.9% sterile normal saline. Liquid extract (0.1 ml) was spread on the nutrient agar plates and bacterial colonies were enumerated after incubation for 24 h at 37°C. Dry matter determined as following formula [9]:

DM(%)= dry weight/fresh weight×100

Data analysis carried out by using SPSS and MSTATC softwares and mean comparisons was done according LSD test.

RESULTS AND DISCUSSION

Analysis of variance indicated that the effect of salicylic acid on vase life and water uptake was significant at 5% probability level, and also was significant on bacterial colonies population in vase solution and dry matter percent at 1% probability level. Mean comparisons about salicylic acid effect vase life, bacterial colonies population in vase solution and dry matter percent showed that 150 mg l^{-1} salicylic acid had the most effective treatment with 12.67 days vase life, 48.17 log_{10}CFUml^{-1} bacterial colonies and 12.86% dry matter, also, the most water uptake (1.59 ml g^{-1} F.W.) was observed in 50 mg l^{-1} salicylic acid. The effectiveness of this compound can be due to water relations enhancement, prevent vascular occlusion due to antimicrobial effect, anti-ethylene effect which reduces respiration rate of cut flowers and increased dry matter percent [4, 8]. Zamani et al., (2011) reported that 1.5 mM salicylic acid (SA) increased water uptake about 13 ml compared to the control in cut chrysanthemum (*Chrysanthemum morifolium* L.). Nikkhah Bahrami et al. (2011) evaluated effect of different concentrations of salicylic acid on vase life of cut *Lisianthus* (*Eustoma grandiflora*) and reported that 100 mg l^{-1} of SA enhanced solution uptake and vase life compared the control. Alaey et al. (2011) investigated on effects of salicylic acid pre and postharvest on cut rose and found that different levels of salicylic acid increased stem fresh & dry weight and also leaf area compared to control. Abdul-Wasea (2011) in his study on snapdragon cut flower (*Antirrhinum majus*) found that treatment with anti-ethylene compounds and anti-microbial compounds increased the amount of carbohydrates in comparison to control which is in agreement with our results. Also, our results about the effectiveness of anti-ethylene compounds on vase life enhancement and qualitative indexes of cut flowers is in accordance with Edrisi et al., (2012), Kiamohammadi (2011) and Hosseinzadeh Liavali & Zarchini (2012).

Table 1- Effect of salicylic acid on quality and longevity of cut carnation cv. 'Liberty Abgr'

Treatments	Water uptake (ml g^{-1} F.W.)	Dry matter (%)	Bacterial colonies in vase solution (log_{10} CFU ml^{-1})	Vase life (days)
S_1(Control)	1.48a	8.68b	94.67a	10.62b
S_2(50 mg l^{-1} SA)	1.59b	10.44ab	57.58b	12.07a
S_3(100 mg l^{-1} SA)	1.52b	10.81ab	63.83ab	11.48a
S_4(150 mg l^{-1} SA)	1.52b	12.86a	48.17b	12.67a

**In each column, means with the same letters are not significantly different.*

CONCLUSION

In present study, salicylic acid increased vase life of cut flowers and had the least bacterial clonies population in vase solution.

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